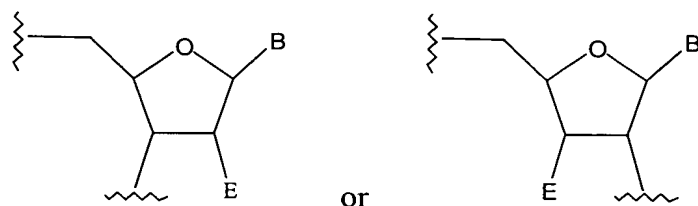


3. (Amended) The compound of claim 1, wherein Q is a nucleoside of the formula:

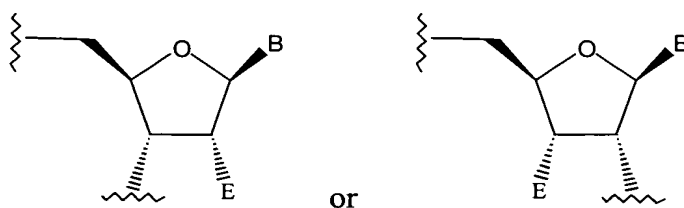


wherein:

B is a labeling group, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $NR^{11}R^{12}$, CN, NO_2 , N_3 , and a halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or an alkyl; and

E is H, a halogen, OR^{13} , NHR^{13} , or $NR^{13}R^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl.

5. (Amended) The compound of claim 1, wherein Q is an oligonucleotide comprising a nucleoside, a nucleoside, or an oligomer comprising a nucleoside, wherein said nucleoside is of the formula:



wherein:

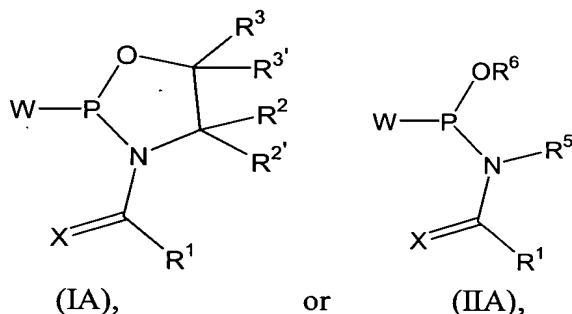
B is a labeling group, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $NR^{11}R^{12}$, CN, NO_2 , N_3 , and a halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or a C_1 - C_6 alkyl; and

E is H, a halogen, OR^{13} , NHR^{13} , or $\text{NR}^{13}\text{R}^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl.

7. (Amended) The compound of claim 1, wherein R^1 is an alkyl, which is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of fluorine, OR^7 , and SR^7 , wherein R^7 is an alkyl or an aryl.

9. (Amended) The compound of claim 1, wherein R^4 is a 4,4'-dimethoxytrityl group.

10. (Amended) A compound of the formula:



wherein:

W is a leaving group;

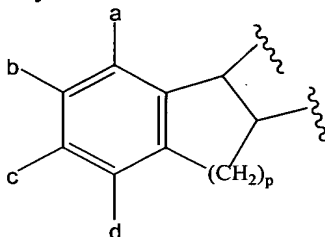
R^1 is an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^1 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of R^7 , OR^7 , SR^7 , NR^8COR^7 , NR^8CSR^7 , $\text{NR}^8\text{CO}_2\text{R}^7$, $\text{NR}^8\text{C(O)SR}^7$, $\text{NR}^8\text{CS}_2\text{R}^7$, O_2CR^7 , S_2CR^7 , SCOR^7 , OCSR^7 , SO_2R^7 , OSO_2R^7 , $\text{NR}^8\text{SO}_2\text{R}^7$, CN, NO_2 , N_3 , and a halogen, wherein R^7 is an alkyl, an aryl or an aralkyl, wherein R^7 is unsubstituted or substituted with one or more halogen atoms, which are the same or different, and R^8 is H or an alkyl;

R^2 and $\text{R}^{2'}$ are the same or different and each is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^2 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of OR^7 , CN, NO_2 , N_3 , and a halogen;

R^3 and $\text{R}^{3'}$ are the same or different and each is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^3 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a trialkylsilyl, an aryldialkylsilyl, an alkyl diarylsilyl, CN, NO_2 , N_3 , a halogen, OR^7 ,

$P(O)(OR^7)(OR^8)$, COR^9 , CSR^9 , CO_2R^9 , $COSR^9$, $CSOR^9$, $CONR^8R^9$, $CSNR^8R^9$, SO_2R^9 , and $SO_2NR^8R^9$, wherein R^9 is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aralkyl, or an aryl, wherein R^9 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of CN, NO_2 , N_3 , and a halogen; or

R^2 and R^3 , $R^{2'}$ and R^3 , R^2 and $R^{3'}$, or $R^{2'}$ and $R^{3'}$, together with the carbon atoms to which they are bonded, comprise a cyclic substituent of the formula:



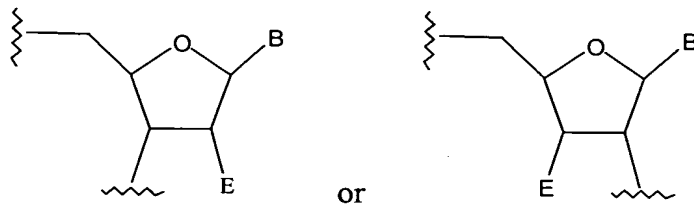
wherein p is an integer from 0-6 and a - d are the same or different and each is selected from the group consisting of H, an alkyl, a nitro, an amino, a hydroxy, a thio, a cyano and a halogen;

R^4 is a protecting group or a solid support;

R^5 is H or an alkyl, which is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of OR^7 , CN, NO_2 , N_3 , and a halogen;

R^6 is a protecting group, an amidoalkyl in which the nitrogen atom thereof is 2, 4, or 5 carbon atoms removed from the oxygen of OR^6 , an alkyl, an alkyl ketone, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^6 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of CN, NO_2 , N_3 , and a halogen;

Q is an a nucleoside, oligonucleotide comprising a nucleoside, or an oligomer comprising a nucleoside, wherein said nucleoside is of the formula:



wherein:

B is a labeling group, an alkyl, an alkenyl an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $NR^{11}R^{12}$, CN, NO_2 , N_3 , and a

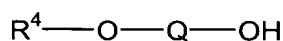
halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or an alkyl; and,

E is H, a halogen, OR^{13} , NHR^{13} , or $NR^{13}R^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl; and

X is O, S, or Se.

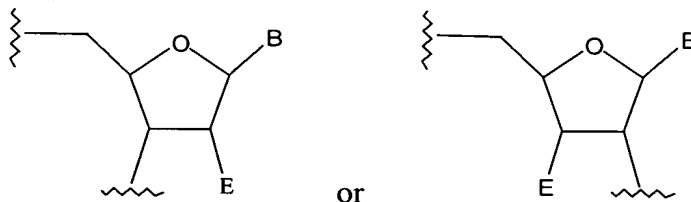
16. (Amended) The method of claim 12, wherein said nucleophile is attached to a solid support.

17. (Amended) The method of claim 12, wherein said nucleophile is of the formula:



wherein:

Q is a nucleoside, oligonucleotide comprising a nucleoside, or an oligomer comprising a nucleoside, wherein said nucleoside is of the formula:



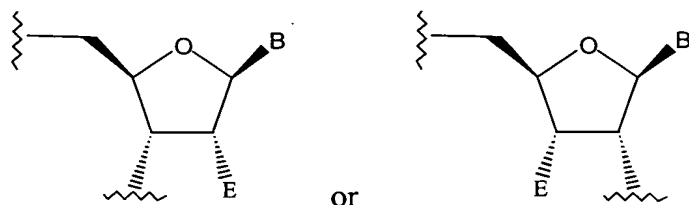
wherein:

B is a labeling group, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $NR^{11}R^{12}$, CN, NO_2 , N_3 , and a halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or an alkyl; and

E is H, a halogen, OR^{13} , NHR^{13} , or $NR^{13}R^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl; and

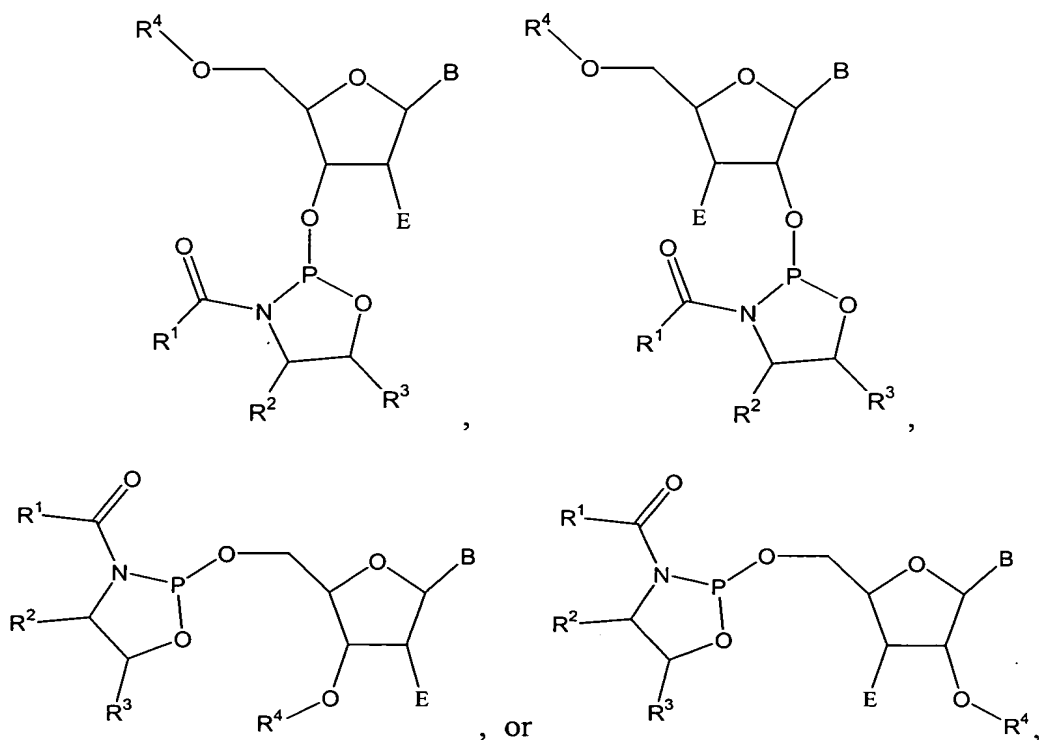
R^4 is a solid support.

19. (Amended) The method of claim 17, wherein Q is a nucleoside, an oligonucleotide comprising a nucleoside, or an oligomer comprising a nucleoside, wherein said nucleoside is of the formula:



wherein B and E are as defined in claim 17.

20. (Amended) The method of claim 12, wherein said N-acylphosphoramidite is of the formula:



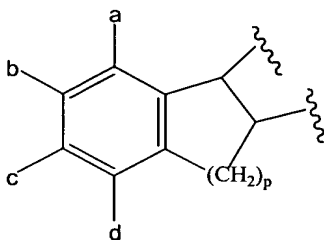
wherein:

R^1 is an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^1 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of R^7 , OR^7 , SR^7 , NR^8COR^7 , NR^8CSR^7 , $NR^8CO_2R^7$, $NR^8C(O)SR^7$, $NR^8CS_2R^7$, O_2CR^7 , S_2CR^7 , $SCOR^7$, $OCSR^7$, SO_2R^7 , OSO_2R^7 , $NR^8SO_2R^7$, CN , NO_2 , N_3 , and a halogen, wherein R^7 is an alkyl, an aryl or an aralkyl, wherein R^7 is unsubstituted or substituted with one or more halogen atoms, which are the same or different, and R^8 is H or an alkyl;

R^2 is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^2 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of OR^7 , CN , NO_2 , N_3 , and a halogen;

R^3 is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, or an aralkyl, wherein R^3 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a trialkylsilyl, an aryldialkylsilyl, an alkyl diarylsilyl, CN, NO_2 , N_3 , a halogen, OR^7 , $\text{P}(\text{O})(\text{OR}^7)(\text{OR}^8)$, COR^9 , CSR^9 , CO_2R^9 , COSR^9 , CSOR^9 , CONR^8R^9 , CSNR^8R^9 , SO_2R^9 , and $\text{SO}_2\text{NR}^8\text{R}^9$, wherein R^9 is H, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aralkyl, or an aryl, wherein R^9 is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of CN, NO_2 , N_3 , and a halogen; or

R^2 and R^3 , together with the carbon atoms to which they are bonded, comprise a cyclic substituent of the formula:



wherein p is an integer from 0-6 and a - d are the same or different and each is selected from the group consisting of H, an alkyl, a nitro, an amino, a hydroxy, a thio, a cyano and a halogen;

R^4 is a protecting group or a solid support;

B is a labeling group, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $\text{NR}^{11}\text{R}^{12}$, CN, NO_2 , N_3 , and a halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or an alkyl; and,

E is H, a halogen, OR^{13} , NHR^{13} , or $\text{NR}^{13}\text{R}^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl.

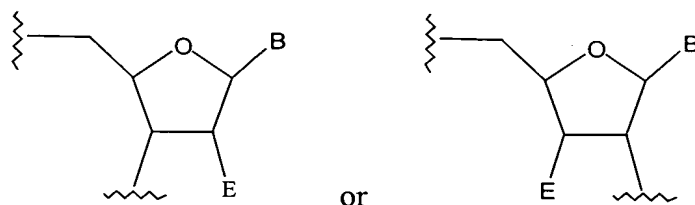
22. (Amended) The method of claim 20, wherein R^1 is an alkyl, which is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of fluorine, OR^7 , and SR^7 , wherein R^7 is an alkyl, an aryl, or an aralkyl.

23. (Amended) The method of claim 20, wherein R^3 is a vinyl group, a phenyl, or a benzyl.

24. (Amended) The method of claim 20, wherein R^4 is a 4,4'-dimethoxytrityl group.

Add the following claims:

26. (New) The compound of claim 2, wherein each of Q and Q^1 is a nucleoside of the formula:



wherein:

Q and Q^1 are the same or different;

B is a labeling group, an alkyl, an alkenyl, an alkynyl, a cycloalkyl, an aryl, a heteroaryl, a heterocycloalkyl, an aralkyl, an amino, an alkylamino, a dialkylamino, a purine, a pyrimidine, adenine, guanine, cytosine, uracil, or thymine, wherein B is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of a protecting group, R^{11} , OR^{11} , NHR^{11} , $NR^{11}R^{12}$, CN, NO_2 , N_3 , and a halogen, wherein R^{11} and R^{12} are the same or different and each is H, a protecting group, or an alkyl; and

E is H, a halogen, OR^{13} , NHR^{13} , or $NR^{13}R^{14}$, wherein R^{13} and R^{14} are the same or different and each is H, a protecting group, an alkyl, or an acyl.

27. (New) The compound of claim 2, wherein R^1 is an alkyl, which is unsubstituted or substituted with one or more substituents, which are the same or different, selected from the group consisting of fluorine, OR^7 , and SR^7 , wherein R^7 is an alkyl or an aryl.

28. (New) The compound of claim 2, wherein R^4 is a 4,4'-dimethoxytrityl group.